

## CLAIMS

1. A coherent light source, comprising:  
a wide stripe semiconductor laser;  
5 a mode converter for beam shaping the light emitted from the semiconductor laser;  
a single-mode waveguide to which the light from the semiconductor laser is coupled through  
the mode converter; and  
a wavelength selecting filter that feeds back part of the light transmitted by the single-mode  
waveguide to the active layer of the semiconductor laser,  
10 wherein the oscillation mode of the semiconductor laser is limited by the light that has been  
fed back.
2. The coherent light source according to Claim 1, wherein part of the light coupled to  
the single-mode waveguide is also reflected at the exit end face of the single-mode waveguide, and  
15 fed back to the active layer of the semiconductor laser.
3. The coherent light source according to Claim 1 or 2, wherein the wavelength selecting  
filter includes a band pass filter and a reflector, and  
light that has been transmitted by the single-mode waveguide goes through the band pass filter,  
20 and then part of it is reflected by the reflector and fed back to the active layer of the semiconductor  
laser.
4. The coherent light source according to Claim 3, wherein the band pass filter and the  
reflector are formed integrally with the single-mode waveguide as a Bragg reflection grating.  
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5. The coherent light source according to Claim 1, wherein the wavelength selecting  
filter is constituted by a volume grating.
6. The coherent light source according to Claim 1, wherein the wavelength selecting  
30 filter is a fiber grating.

7. The coherent light source according to Claim 1, wherein the wavelength selecting filter is formed integrally with the semiconductor laser as a Bragg reflection grating.

8. The coherent light source according to any of Claims 1 to 7, wherein the mode converter is a tapered waveguide.

9. The coherent light source according to any of Claims 1 to 7, wherein the mode converter is a tapered fiber.

10. The coherent light source according to any of Claims 1 to 9, wherein the single-mode waveguide has a periodic polarization inversion structure, and part of the light from the semiconductor laser is subjected to wavelength conversion by the polarization inversion structure.

11. The coherent light source according to Claim 8, comprising:  
a wide stripe semiconductor laser;  
a tapered waveguide having an incident end face to which light from the semiconductor laser is coupled;  
a single-mode waveguide formed on the exit end face side of the tapered waveguide;  
a band pass filter that transmits part of the light from the single-mode waveguide; and  
a reflector that reflects the light transmitted by the band pass filter and feeds this light back to the active layer of the semiconductor laser,  
wherein the oscillation mode of the semiconductor laser is limited by the light that has been fed back.

12. The coherent light source according to Claim 11, wherein the band pass filter is formed integrally with the single-mode waveguide as a Bragg reflection grating.

13. The coherent light source according to Claim 11 or 12, wherein the single-mode waveguide is composed of a nonlinear optical material and has a periodic polarization inversion structure, and

part of the light from the semiconductor laser is subjected to wavelength conversion by the polarization inversion structure.

14. A coherent light source, comprising:

5 a wide stripe semiconductor laser including a Bragg reflection grating;

a tapered waveguide having an incident end face to which light from the semiconductor laser is coupled;

a single-mode waveguide formed on the exit end face side of the tapered waveguide; and

a reflector that reflects part of the light from the single-mode waveguide and feeds this light

10 back to the active layer of the semiconductor laser,

wherein the oscillation mode of the semiconductor laser is limited by the light that has been fed back.

15 15. The coherent light source according to Claim 14, wherein the single-mode waveguide

is composed of a nonlinear optical material and has a periodic polarization inversion structure, and

part of the light from the semiconductor laser is subjected to wavelength conversion by the polarization inversion structure.

16. The coherent light source according to Claim 14 or 15, wherein the exit end face of the

20 single-mode waveguide has a dichroic mirror that transmits fundamental waves and transmits higher harmonic waves.

17. The coherent light source according to any of Claims 1 to 16, wherein the active layer

width of the wide stripe semiconductor laser is 100  $\mu\text{m}$  or less.

18. The coherent light source according to any of Claims 1 to 17, wherein the lateral mode

of the semiconductor laser is substantially fixed to single-mode oscillation by feedback light.

19. An optical device, having an image conversion optical system and the coherent light

30 source according to any of Claims 1 to 18, wherein light from the coherent light source is converted by the optical system into a two-dimensional image.

20. The optical device according to Claim 19, wherein the image conversion optical system has a two-dimensional beam scanning optical system.

21. The optical device according to Claim 19, wherein the image conversion optical  
5 system has a two-dimensional switch.